

IN THE CLAIMS

Please amend claims 6, 8, 16, 26 and 28, cancel claims 1-5, 12-15, and 21-25, and add new claims 33-43 as follows:

## 1-5. (CANCELLED)

6. (CURRENTLY AMENDED) A holographic memory system comprising:

(a) a photorefractive crystal configured to store holograms;

(b) a single laser diode configured to emit a two-dimensional (2D) plane wave collimated laser beam to both write a page of data to and read the page of data from the photorefractive crystal; and

(c) a spatial light modulator to encode the page of data on an input beam split from the collimated laser beam;

(d) a first imaging relay lens pair positioned between the spatial light modulator and the photorefractive crystal to image a spatial light modulator image on a plane behind the photorefractive crystal; and

(e) one or more Micro-Electro-Mechanical Systems (MEMS) mirrors configured to steer a 2D plane wave reference beam, split from the collimated laser beam, at high speed to the photorefractive crystal to read or write a page of data.

7. (PREVIOUSLY PRESENTED) The system of claim 6, wherein the one or more MEMS mirrors scans the reference beam along a horizontal plane in parallel with a C-axis of the photorefractive crystal.

8. (CURRENTLY AMENDED) The system of claim 6, wherein the reference beam and ~~an~~ the input beam, obtained from the collimated laser beam, create an interference pattern in the photorefractive crystal to record the hologram.

9. (ORIGINAL) The system of claim 6, wherein during writing to the photorefractive crystal, the MEMS mirror is varied by a small increment with respect to each new data page to

specifically orient the reference beam to the photorefractive crystal in an angular multiplexing scheme.

10. (ORIGINAL) The system of claim 6, wherein the photorefractive crystal comprises Fe:LiNbO<sub>3</sub> photorefractive material.

11. (ORIGINAL) The system of claim 6, wherein the holographic memory system is configured for use with both analog and digital holograms.

12-15. (CANCELLED)

16. (CURRENTLY AMENDED) A method for storing data in holographic memory comprising:

a single laser diode emitting a two-dimensional (2D) plane wave collimated laser beam for both writing a hologram-page of data to and reading the hologram-page of data from a photorefractive crystal;

splitting the collimated laser beam into a 2D plane wave-reference beam and an input beam; passing the input beam through a spatial light modulator to encode the page of data in the input beam;

passing the input beam through a first imaging relay lens pair for imaging a spatial light modulator image on a plane behind the photorefractive crystal;

one or more Micro-Electro-Mechanical Systems (MEMS) mirrors steering the 2D plane wave-reference beam at high speed to the photorefractive crystal; and

storing the page of data in the photorefractive crystal in a form of an interference pattern created by the steered 2D plane wave-reference beam and the input beam.

17. (PREVIOUSLY PRESENTED) The method of claim 16, wherein the one or more MEMS mirrors steers the reference beam by scanning the reference beam along a horizontal plane in parallel with a C-axis of the photorefractive crystal.

18. (ORIGINAL) The method of claim 16, wherein during writing to the photorefractive crystal, the MEMS mirror is varied by a small increment with respect to each new data page to specifically orient the reference beam to the photorefractive crystal in an angular multiplexing scheme.

19. (ORIGINAL) The method of claim 16, wherein the photorefractive crystal comprises  $\text{Fe:LiNbO}_3$ , photorefractive material.

20. (ORIGINAL) The method of claim 16, wherein data may be stored in the hologram in either analog or digital form.

21-25. (CANCELLED)

26. (CURRENTLY AMENDED) An apparatus for storing data in a holographic memory comprising:

means for storing a hologram one or more pages of data;

means for emitting a two dimensional (2D) plane wave-collimated laser beam to both write to and read from the means for storing;

spatial light modulator means for encoding the page of data on an input beam split from the collimated laser beam;

means for imaging a spatial light modulator image on a plane behind the means for storing;  
and

one or more Micro-Electro-Mechanical Systems (MEMS) mirrors configured to steer a 2D plane wave-reference beam, split from the collimated laser beam, at high speed to the means for storing to read or write a page of data.

27. (PREVIOUSLY PRESENTED) The apparatus of claim 26, wherein the one or more MEMS mirrors scans the reference beam along a horizontal plane in parallel with a C-axis of the means for storing the hologram.

28. (CURRENTLY AMENDED) The apparatus of claim 26, wherein the reference beam and ~~and the~~ input beam, obtained from the collimated laser beam, create an interference pattern in the means for storing to record the hologram.

29. (ORIGINAL) The apparatus of claim 26, wherein during writing to the means for storing, the MEMS mirror is varied by a small increment with respect to each new data page to specifically orient the reference beam to the means for storing in an angular multiplexing scheme.

30. (ORIGINAL) The apparatus of claim 26, wherein the means for storing comprises Fe:LiNbO<sub>3</sub> photorefractive material.

31. (ORIGINAL) The apparatus of claim 26, wherein the apparatus is configured for use with both analog and digital holograms.

32. (NEW) The system of claim 6 wherein:  
the spatial light modulator has a first aperture;  
the one or more MEMS mirrors have a second aperture; and  
the reference beam passes through a second imaging relay lens pair before impinging on the one or more MEMS mirrors, wherein the second imaging relay lens pair compensates for a scale difference between the first aperture and the second aperture.

33. (NEW) The system of claim 6 wherein the reference beam impinges on the photorefractive crystal as a collimated laser beam.

34. (NEW) The system of claim 6 further comprising:  
a second imaging relay lens pair positioned between the one or more MEMS mirrors and the photorefractive crystal for matching a scale difference between the one or more MEMS mirrors and an entrance pupil on the photorefractive crystal.

35. (NEW) The method of claim 16 further comprising compensating a scale difference between a first aperture of the spatial light modulator and a second aperture of the one or more MEMS mirrors.

36. (NEW) The method of claim 16 further comprising impinging the reference beam on the photorefractive crystal as a collimated beam.

37. (NEW) The method of claim 16 further comprising matching a scale difference between the one or more MEMS mirrors and an entrance pupil on the photorefractive crystal.

38. (NEW) The apparatus of claim 26 further comprising means for matching a scale difference between the one or more MEMS mirrors and an entrance pupil on the means for storing.

39. (NEW) The apparatus of claim 26 further comprising means for compensating a scale difference between a first aperture of the spatial light modulator means and a second aperture of the one or more MEMS mirrors.

40. (NEW) The apparatus of claim 26 further comprising the reference beam impinging on the means for storing as a collimated beam.

41. (NEW) The system of claim 6 wherein the first imaging relay lens pair scales an imaging size of the spatial light modulator to match that of an input pupil of the photorefractive crystal.

42. (NEW) The method of claim 16 wherein the first imaging relay lens pair scales an input size of the spatial light modulator to match that of an input pupil of the photorefractive crystal.

43. (NEW) The apparatus of claim 26 further comprising means for scaling an input size of the spatial light modulator means to match that of an input pupil of the means for storing.